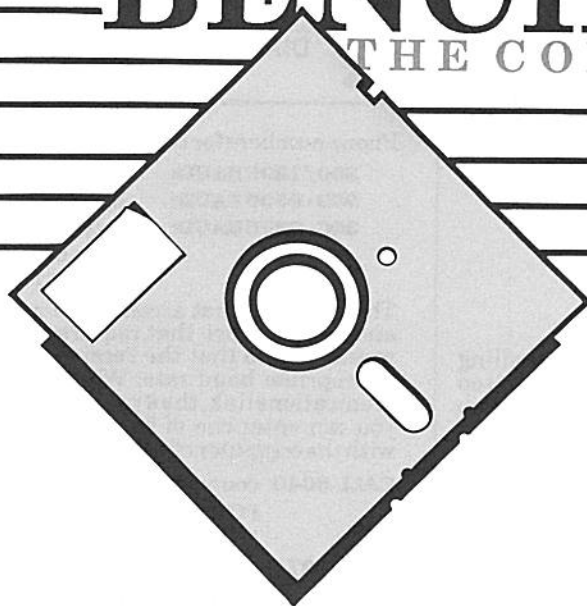


BENCHMARKS

THE COMPUTING CENTER



University of North Texas

VOLUME 10 NUMBER 4

APRIL 1989

FOCUS ON PRINTING

New HP-2680A Printing
Environments

(Page 2)

Desktop Laser Printing

(Page 12)

Choosing a Color Printer

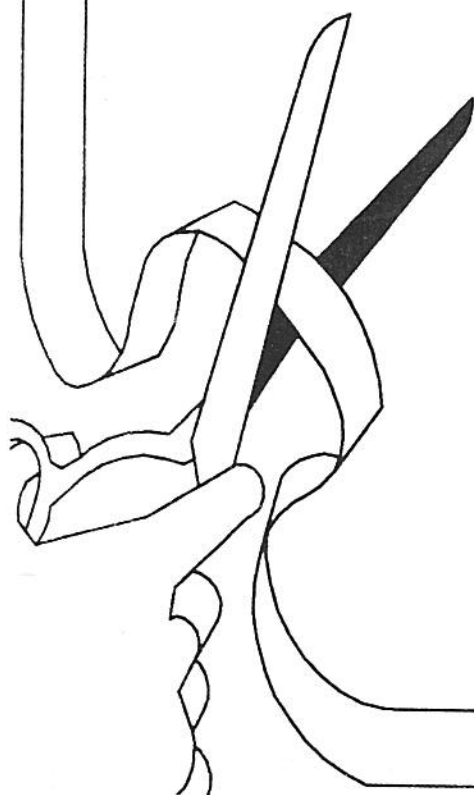
(Page 14)

A Roundtable Discussion on
PC Printers

(Page 17)

A Lexicon of Desktop Printing

(Page 22)





SERVICES AVAILABLE TO USERS OF THE UNT COMPUTING FACILITIES

The UNT Computing Center is located in the Information Sciences Building (ISB), Room 119. Phone Numbers:

Computing Center: (817) 565-2324
Help Desk: (817) 565-4050
Micro Support: (817) 565-2316, 565-2319
Graphics Lab: (817) 565-3479
ISB I/O Area: (817) 565-3890
BA I/O Area: (817) 565-2350

All personnel listed below can be contacted either by calling the Computing Center or by sending them electronic mail on MUSIC/SP (ID-codes follow each name. All IDs are on BITNET node UNTMUSIC).

Benchmarks - Claudia Lynch (AS04)

Information & ID-Codes; Disk Space Problems - Marilyn Jett

Statistical/Research Support - George Morrow (AS01), Panu Sittiwong (AC09), Phanit Laosirirat (AC44)

Academic ADABAS/COM-LETE - Janis Burkham (AC55)

CRSP & COMPUSTAT Problems - Panu Sittiwong (AC09), Phanit Laosirirat (AC44)

Student Programming Problems - CSCI Dept., GAB Room 542A; BCIS Dept., BARoom 152

Problems with JCL, Passwords, or Operating Systems; or Communication/Terminal Problems - Help Desk

Data Entry; Test Scoring & Analysis - Betty Grise

Administrative Applications - Coy Hoggard

Printout Retrieval - ISB or BA I/O Operators



DIALING-UP UNT COMPUTERS OVER THE TELEPHONE

Phone numbers for the Local Area Network (LAN) are:

300/1200 BAUD: (817) 565-3300, (817) 565-3499
300-9600 BAUD: (817) 565-3461
300-9600 BAUD: D/FW METRO 429-6006, 429-9314
 Area code 214 must dial 817 before the METRO number.

The numbers that accommodate multiple baud rates have an autobaud feature that requires you to hit the <RETURN> key repeatedly so that the receiving modem can determine the appropriate baud rate. When you have established a communications link, the # prompt will appear on your screen and you can enter one of the following CALL commands to connect with the computer of your choice.

CALL 8040 connects with the NAS/8083 (supports line editing or PCWS). Operating environments available are: MUSIC/SP, VM/CMS.

CALL 3270 connects with the NAS/8083 through a 3270 protocol converter (supports full-screen editing). Operating environments are: MUSIC/SP, VM/CMS, ADABAS/COM-LETE, PHOENIX

CALL DEC connects with the VAXcluster (VMS, Eunice)

CALL 780 connects with the Research VAX (Unix)

CALL 3000 connects with the Libraries' HP-3000 (Bibliographic data base).

CALL 6800 connects with the NBI (Unix)

Communications Settings

LAN addresses	Data Bits	Parity	Stop Bits
DEC, 3000	8	N	1
8040, 3270, 780, 6800	7	E	1

HOURS FOR UNIVERSITY OF NORTH TEXAS COMPUTER ACCESS AREAS : SPRING 1989*

Location	Days	Times
Computing Center RJE	Sunday Monday Tuesday-Saturday	Noon-Midnight 7 a.m.-Midnight 7 a.m., Tues.-Midnight Sat. (Open 24 hours/day)
ISB 110 Terminal Area	Sunday Monday-Thursday Friday Saturday	1 p.m.-Midnight 7:30 a.m.-Midnight 7:30 a.m.-9 p.m. 9 a.m.-9 p.m.
College of Business	Saturday, Sunday Monday-Thursday Friday	Noon-11:45 p.m. 8:15 a.m.-11:45 p.m. 8:15 a.m.-7:45 p.m.
GAB 550C	Sunday Monday-Thursday Friday Saturday	2 p.m.-Midnight 8 a.m.-Midnight 8 a.m.-5 p.m. 2 p.m.-7 p.m.
Graphics Lab	Sunday Monday-Thursday Friday Saturday	Noon-10 p.m. 8 a.m.-11 p.m. 8 a.m.-6 p.m. Noon-5 p.m.

*Hours may vary. Check MUSIC/VAX News and/or posted schedules for exceptions.

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GENERAL INFORMATION

Focus on Printing

By Claudia Lynch, *Benchmarks* Editor (BITNET: AS04@UNTVM1)

The ability to get printed output in a format suitable for your particular needs is a very important aspect of computing, be it mainframe or microcomputer-based. This issue of *Benchmarks* heralds the beginning of a new direction for this publication. A direction which will allow us, it is hoped, to provide you with more comprehensive information on specific topics. We will try to have a theme for most issues, writing specifically for that theme, but we will also continue to inform you on important aspects of computing here at UNT. The advantage of this approach is that it gives more of a focus to each issue and provides more in-depth information on specific topics. The disadvantage is that it is more labor-intensive for the contributing staff members.

The first articles focusing on printing in this issue concern the HP-2680A laser printers that serve as the primary output devices for the mainframe computing systems here at UNT. There is also an article in the VAX section concerning these printers. The HP-2680A laser printers provide high quality output and allow people to specify different print environments, depending on the specific needs of their applications. For example, it is possible to ask for two logical pages of print to be compressed onto one page of output, thereby reducing the size of the printout. This is particularly useful in situations where there is a lot of print to be generated but it is only needed for reference purposes. It is also possible to ask for courier style characters to be printed on a "letter-style" page. This is useful for applications that require document-quality text. If you are interested in mainframe printing, make sure and read the articles on pages two and three.

The rest of the printing articles are found mainly in the *Microcomputers* section, although printing-related issues are covered in *Benchmarks Forum* and the *List of the Month*. The first article concerning microcomputer-based printers gives an overview of desktop laser printing. The next article tackles the relatively new technology of color printing. The third article, and perhaps the most ambitious project ever attempted for *Benchmarks*, is the transcript of a roundtable discussion on microcomputer printers. Finally, a lexicon of printing terms, LaserJet cleaning tips, and an article about printing to a PC from the VAX complete the offerings on this topic.

We hope that you enjoy and benefit from the articles in this issue. If you have a topic or topics that you would like to see covered in subsequent issues, please let us know. We will make every effort to provide you with information on subjects that you are interested in. If you feel you have a particular expertise and/or interest in an area and would like to share that with the *Benchmarks* audience, we would appreciate that also. Guest contributors are always welcome. Suggestions and/or contributions may be mailed to the Computing Center address given at the end of this issue, or you may send them to me electronically to the User-ID listed on the byline of this article. §

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New Printing Environments Available on the HP-2680A Laser Printers

By Lynne Rutherford, Computer Operations Supervisor (BITNET:AO02@UNTMUSIC) and Claudia Lynch, *Benchmarks* Editor (BITNET: AS04@UNTVM1)

The Hewlett-Packard 2680A laser printers, located in the ISB and COB output areas, provide high-quality computer-generated output for users of the NAS/8083 and VAX computers. These printers allow for the selection of various printing environments by overriding the SYSPRINT DD statement in your JCL.

The differences in printing environments involve character styles (fonts), whether the output is rotated or unrotated, and the number of lines per page that can be printed. Rotated output (always 90 degrees) is printed as a standard 8.5x11 letter would be. Unrotated output refers to standard 132 column wide output which is longer horizontally than vertically. It should be noted that the number listed as "lines per page" is the maximum number of lines that the laser printers will allow to be printed on a page for a particular print environment. Most programs perform a "skip to top of page" for page positioning, so the first line printed is actually on line four of the paper.

Several new print environments have been made available to users of the Hewlett Packard 2680A laser printers. A brief description of the new environments is given below along with a table of all characters available with each print environment. Other print environments are discussed in an article on page three.

PNB1

PNB1 uses the PN01 standard IBM print train environment on a "GREEN BAR" style form. This was created to make certain types of unrotated output easier to read.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0-																
1-																
2-																
3-																
4-																
5-																
6-																
7-																
8-																
9-																
A-																
B-																
C-																
D-																
E-																
F-																

The characteristics of PNB1 are:

- 13 Characters Per Inch
- 0 Degrees Rotation
- 132 Characters Per Line
- 66 Lines Per Page - Called
With: //SYSPRINT DD SYSOUT=(A,PNB1)

PNW1

PNW1 uses the PN01 standard IBM print train environment in a smaller (6 point) size on a rotated page, to provide a greater number of characters per line, and more lines per page. The characteristics of the PNW1 environment are:

- 18 Characters Per Inch
- 90 Degrees Rotation
- 132 Characters Per Line
- 132 Lines Per Page - Called
With: //SYSPRINT DD SYSOUT=(A,PNW1)

A table of characters for this environment appears on page 3.

TNW1

TNW1 uses the standard text print train (same size print as TNS1), but it is rotated 90 degrees, thus allowing a greater number of lines to print per page. The characteristics of TNW1 are:

- 15 Characters Per Inch
- 90 Degrees Rotation
- 127 Characters Per Line
- 99 Lines Per Page - Called
With: //SYSPRINT DD SYSOUT=(A,TNW1)

A table of characters for this environment appears on page three.

In addition to these new print environments, several forms have been designed to print on the Hewlett Packard Laser printer. These forms are used for special Administrative printing applications.\$

PNW1 Print Environment

	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
0-																
1-																
2-																
3-																
4-			r	r	J	L		-	T	+	[	.	<	(	+	!
5-	&	+	+	+								]	\$	*	)	;
6-	-	/											,	x	-	>
7-												:	9	0	'	"
8-			a	b	c	d	e	f	g	h	i					
9-			j	k	l	m	n	o	p	q	r					
A-			~	s	t	u	v	w	x	y	z					
B-																
C-	(	A	B	C	D	E	F	G	H	I						
D-	)	J	K	L	M	N	O	P	Q	R						
E-	\		S	T	U	V	W	X	Y	Z						
F-	0	1	2	3	4	5	6	7	8	9	-	+	*	.		

TNW1 Print Environment

	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
0-																
1-																
2-																
3-																
4-			r	r	J	L		-	T	+	e	.	<	(	+	!
5-	&	+	+	+								!	\$	*	)	;
6-	-	/											,	%	-	>
7-												:	#	0	'	"
8-			a	b	c	d	e	f	g	h	i		{	s	<	+
9-			j	k	l	m	n	o	p	q	r		}	x	>	+
A-			°	s	t	u	v	w	x	y	z		^	r	[	2
B-			°	i	z	z	+	*	*	'	*		^	r	]	~
C-	(	A	B	C	D	E	F	G	H	I						
D-	)	J	K	L	M	N	O	P	Q	R						
E-	\		S	T	U	V	W	X	Y	Z						
F-	0	1	2	3	4	5	6	7	8	9						~

Taking Advantage of HP-2680A Laser Printer Font Options

By Janis Burkham, Academic Database Consultant (BITNET: AC55@UNTVM1) and Claudia Lynch, *Benchmarks* Editor (BITNET: AC55@UNTVM1)

Is the standard format of printed output not meeting the needs of your application? Are massive printouts causing one of your arms to be longer than the other? You might want to try some of the alternate fonts and various character-per-inch settings available in the HP-2680A Laser Printer environment files.

As mentioned in the preceding article, output to the laser printers can be controlled by overriding the SYSPRINT DD card in the job stream. This method causes the portions of the output controlled by SYSPRINT to be printed in the specific environment selected there. If you specify the environment name on the JOB card, the output plus the JCL listing and any diagnostic/system messages will be printed in that print environment.

Examples:

1. For the entire job to be printed in LP2X (compressed) format, specify LP21 on the JOB card:

```
//IDnnjnam JOB (IDnn,1,1,LP21),...
```

2. For selected portion of output to be printed in LP2X format:

```
//SYSPRINT DD SYSOUT=(A,LP21)
```

A partial list of available print environments follows this text. A complete list of these environments, their characteristics, and tables of characters is available from the Computing Center Offices, ISB 119.

It should be noted that **rotated** output (always 90 degrees) refers to output which is printed as a standard 8.5x11 letter would be. The 8.5" sides are the top and bottom, and the 11" sides are the left and right sides. **Unrotated** output refers to standard 132 column wide output which is longer horizontally than vertically. **Lines per page** is quoted as the maximum number of lines that the laser printer will allow to be printed on a page.

- **Standard Output** - No special parameters are needed for standard printed output, so the SYSPRINT DD card is not overridden. Characteristics are:

13 characters per inch	0 degree rotation
132 characters per line	66 lines per page

- **PN01** - PN01 is the standard IBM print train environment file. It is called with //SYSPRINT DD SYSOUT=(A,PN01). Characteristics are:

13 characters per inch	0 degree rotation
132 characters per line	66 lines per page

- **LP2X** - LP2X has the same characteristics as the STANDARD print environment except that the print is compressed. LP stands for **logical page**, which means that 2 logical pages of output can fit on one physical page of a printout. The X can be replaced with any number between 1 and 4. This indicates the number of copies of the document that are to be made within the job. If LP2X is specified, 1 copy will be generated. It is called with //SYSPRINT DD SYSOUT=(A,LP2X)

- **LP4X** - LP4X has the same characteristics as the LP2X except that 4 logical pages of output can fit on one physical page of a printout. It is called with //SYSPRINT DD SYSOUT=(A,LP4X)

- **TN01** - TN01 is the standard text print train("Courier style" characters) supported by Waterloo/SCRIPT and MUSIC/Script. It is called with //SYSPRINT DD SYSOUT=(A,TN01). Characteristics are:

10 characters per inch	90 degree rotation
77 characters per line	66 lines per page

- **TNS1** - TNS1 is the standard text print train, except that its characters are smaller to allow for 132 columns on an unrotated page. It is called with //SYSPRINT DD SYSOUT=(A,TNS1). Characteristics are:

13 characters per inch	0 degree rotation
132 characters per line	66 lines per page

- **PI01** - PI01 is the standard pica type font. It is called with //SYSPRINT DD SYSOUT=(A,PI01). Characteristics are:

10 characters per inch	90 degree rotation
77 characters per line	66 lines per page

- **EL01** - EL01 is the standard elite type font. It is called with //SYSPRINT DD SYSOUT=(A,EL01). Characteristics are:

12 characters per inch	90 degree rotation
90 characters per line	66 lines per page

GOOD-BYE, SO LONG, FAREWELL...

The end of an era has arrived.

Mark your calendars . . . Janis Burkham, Academic Database Consultant (BITNET: ACSS@UNTVMI)

The time has come to say goodbye to an old friend (?)-- the last keypunch machine. At the beginning of Summer I, 1989, the keypunch machine near the ISB I/O area will no longer be available. If you have any punched cards that you want to use, it would be a good idea to transfer those to the MUSIC/SP, CMS, and/or COM-LETE operating systems as soon as possible.

The migration to CRTs has been gradual over the past 10 years at NT. First the interpreters went, then the sorters, next the verifiers, and, slowly, the keypunches.

To the younger crowd, this dinosaur may not be missed (what's a keypunch?), but the older NT crowd will remember "the good ole days" of colored JCL cards, standing in line at the Express Keypunch, dropping unsequenced decks, card jams, and drum cards.

The wave of technology continues to sweep us along at ever-increasing speeds. The advances have made living and learning better than ever. It will be interesting to see what the next era brings. §



Production Services Aids Faculty, Staff

By Betty Grise, Production Services Supervisor

The Production Services section of the Computing Center provides users with batch and on-line data entry. Batch service is essentially a substitute for card entry (keypunch) services with file transfers to any or all of the central computer systems or distribution of data on diskettes. All data is entered (keyed and verified) through the use of a data entry software package called KeyEntry III. Data is distributed to end users through file transfers to the mainframe operating systems using PCWS or Gateway Microsystems software. Data will also be distributed on diskettes if the end user wishes to analyze or manipulate data locally on a PC. Batch services also includes the use of a NCS optical mark reader.

Word Processing services are available for faculty and staff on a limited (time-available) basis. Priorities for completing submitted work have been established by the Dean's Council. **Please note that thesis or dissertation word processing is not accepted. UNT policy also prohibits work that can be categorized for outside employment or consulting.** The work priority groupings are as follows:

Highest Priority Group

- Scholarly articles for publication.
- Speech or presentation.
- Proposal for funding to be submitted via UNT.
- Grant or project report for project with 3xxx or 7xxx number.

Next Highest Priority Group

- Materials to fulfill professional organization responsibilities.
- Scholarly monograph or book.

The word processing services utilize WordPerfect (4.2 or 5.0) and WordStar 4.0, whichever you prefer. Printed output is available from either an HP-LaserJet II or an Apple Laserwriter II.

Data Entry also provides a test scoring/analysis and faculty evaluation service utilizing a NCS 7001 scanner. MUSIC/SP files may also be created utilizing the NCS scanner. Any request for output which deviates from that specified on the evaluation or test scoring/analysis work order form is considered a special request and must be submitted to a member of Academic Computing Services by the user department. The "General All Purpose" scanner sheets may be purchased from the Computing Center. You must have a departmental computer ID-Code to purchase the scanner sheets. Test scoring analysis and faculty evaluations are printed on the HP-2680A laser printer. §

Molta Speaks at Network '89

Dave Molta, Director of Academic Computing, was a featured speaker at *Network '89* in Boston, on March 1. He discussed justifying, installing, and managing large administrative networks in academic environments.

Videodisc Learning in the College of Education

According to an article by UNT faculty members Cliff Hardy and Jon Young in *NewsNotes* (March 1989), the College of Education newsletter, faculty members from that college have been involved in some interesting videodisc learning projects. One such endeavor, designed to provide advanced learning technology to Texas school districts, is the *Physical Science Project*. According to the article, this project is "a complete, technology-based delivery system integrating computer, video, and audio technology programs." The videodisc part of the project is accomplished with the TLTG laser disc computer program, which utilizes the IBM Info-Window touch screen application. This combines the qualities of a television program with the capabilities of a computer. The article further states:

The curriculum is packed with unusual scenarios designed for student motivation yet presents a firm foundation in the physical sciences. For example, when students want more in-depth information about a scientific concept of fail to grasp a concept, the computer program allows them to see the scientific principal approached from a different angle by a different narrator and different illustrations. In addition, the program allows students to work at their own pace. . . . The touch-information windows will also allow handicapped students to activate the program with a pencil or pointer.

For more information about this interesting work, contact Hardy or Young in the College of Education (817-565-2835 or 817-565-2579). §

Computing Center Organization Chart Revised

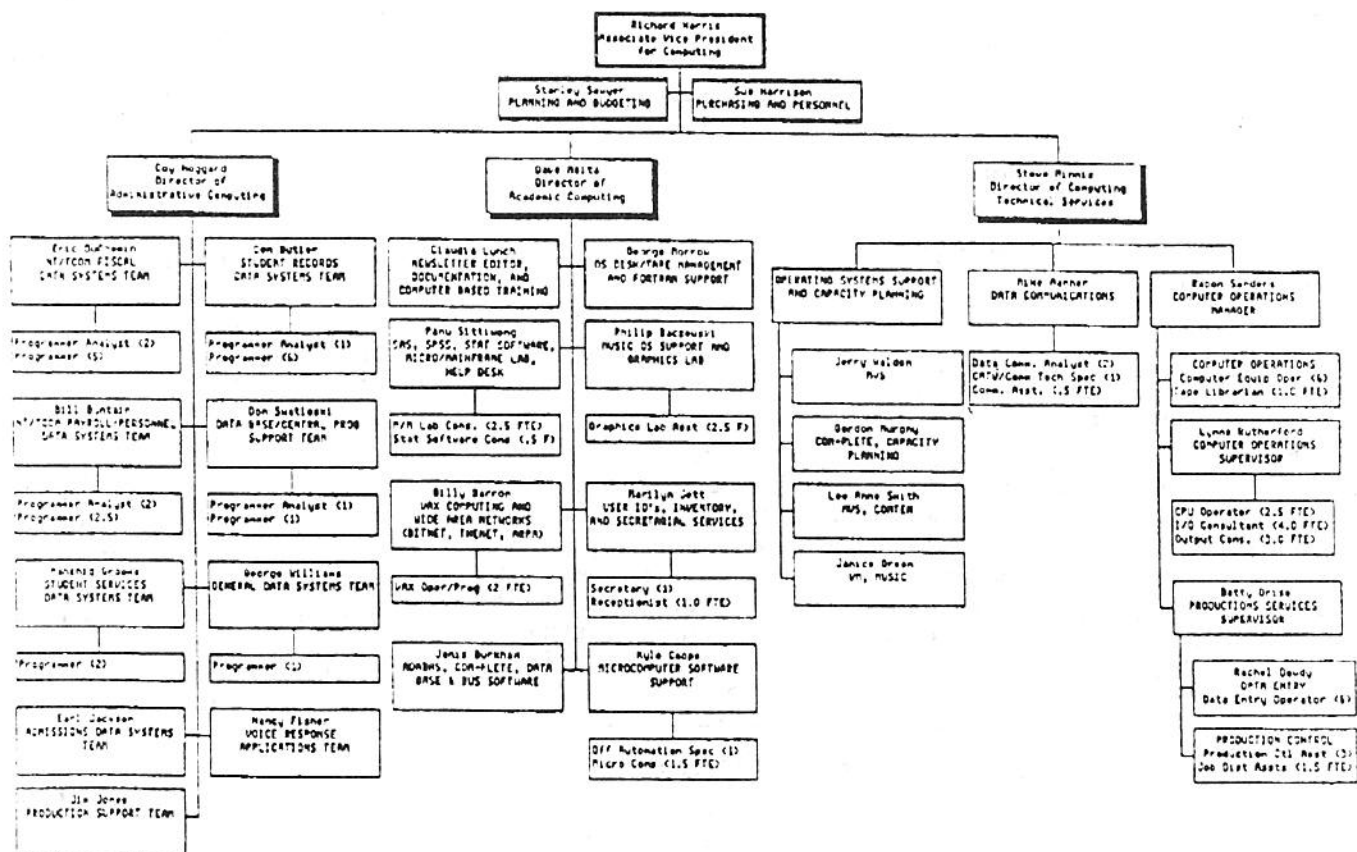
The chart below represents the most current configuration of our organization. This graphic representation may better explain some of the staff movements that have been announced throughout the year. It should be noted that the titles of Coy Hoggard, Dave Molta, and Steve Minnis have been changed to better reflect their functional responsibilities. Coy Hoggard is now Director of Administrative Computing, Dave Molta is Director of Academic Computing, and Steve Minnis is Director of Computing Technical Services.

Faculty/Graduate Seminar on Microcomputer-Based Statistical Packages Scheduled

Academic Computing Services is hosting a seminar on Microcomputer-Based Statistical Packages, Friday, April 21 between the hours of 2 and 5 p.m. The seminar, intended for faculty and graduate students engaged in quantitative research projects, will be in Room 412 of the University Union and will consist of presentations on three statistical packages available for use on microcomputers at UNT: SPSS/PC+, SAS-PC, and Micro-Crunch. Demonstrations of each of the packages will follow the presentations.

All interested faculty and graduate students are encouraged to attend. Reservations may be made by contacting the Computing Center (817-565-2324, ISB 119).

COMPUTING CENTER ORGANIZATION CHART - MARCH 1989



Notes on COBOL and CMS

By Janis Burkham, Academic Database Consultant (AC55@UNTVM1)

- A new *IBM CMS User's Guide for COBOL* manual has been placed in the first floor lab in the College of Business Administration. It should help clear up any questions you have concerning the use of COBOL under CMS.
- The CMS COBOL RUN command performs like a catalogued compile, load, and execute procedure, if you invoke it for a COBOL source file. When you use the RUN command, however, you cannot specify compiler options, nor can you indicate the inclusion of more than one TEXT file for execution.

To compile and execute COBOL programs under CMS with compiler options, enter the following:

```
COBOL progname (op1 op2 ...  
LOAD progname (START
```

or

```
COBOL progname (op1 op2 ...  
LOAD progname  
START *
```

- To submit a batch job from your CMS machine using JCL to run under OS, type SUBMIT in the command area on your filist screen next to the appropriate file. If you have problems with this because your file is too large, type TO MVSSP instead of SUBMIT.
- To transfer files from MUSIC to CMS and vice versa, do as follows:
 - From MUSIC to CMS Type: SENDFILE filename TO userid where filename is the entire MUSIC filename including periods and userid is the receiving CMS userid.
 - From CMS to MUSIC Type: SENDFILE filename TO userid AT UNTMUSIC where filename is the entire CMS filename written as filename (space) filetype (space) filemode and userid is the receiving MUSIC userid.\$

THE BITNET CONNECTION

By Philip Baczewski, BITNET INFOREP (BITNET: AC12@UNTVM1)

*This Column is a continuing feature of **Benchmarks** intended to present news and information on various aspects of the BITNET wide area network.*

In most journalistic situations, it is customary when a new column or feature is added to a publication, that the first presentation be devoted to explaining the general subject matter and discussing the intended content and direction of future editions. Not being one who is normally a slave to ordinary convention, I seem to have altered this custom a bit. Therefore, I am declaring that this, the second offering of *The BITNET Connection*, is the inaugural column of the series.

The impetus for this column came from the fact that while Academic Computing Services management recognizes the value of Wide Area Network services, there is not always an awareness among the user community of the usefulness of wide area networks in their roles as researchers and teachers. While this column cannot provide every bit of information on the BITNET network, it can provide a window to view the type of activity and services on BITNET, and perhaps pique the interest of those who might benefit from BITNET use, but just haven't had the opportunity or inclination to learn more about it.

A companion feature to this column is the *List of the Month*. Special interest group (SIG) electronic mailing lists are one of the more popular and frequently used BITNET services. Each edition of *Benchmarks* will highlight one of these BITNET SIG lists to help foster awareness of the types of subjects covered in these forums. Since subject matter ranges from teaching college-level english to aspects of polymer physics, not every list will be of interest to every person. The intention is to feature lists with a general appeal, or lists on a specific discipline area which might be of interest to a large number of people within that discipline here at North Texas.

Another intention is to highlight BITNET services other than the electronic mailing lists. File servers and directory servers are also important resources on the network. Why the emphasis on services? Well, in the presentations about BITNET that I am called upon to give, I often use the analogy of a telephone network. If you move to a new town, one of the first items you arrange is to have telephone service to your new abode. So, inevitably, you spend one whole day waiting for the telephone installer (who was nice enough to set an appointment with you for "some time between 8:00 and 5:00") and finally end up sitting in an empty room with all of your attention focused upon your new instrument of communicative power. The usual first action is to reach for the telephone book and find the number of some vital service accessible by phone (in this day and age, usually the number of the closest pizza parlor that delivers).

Just as a telephone network is empowering in the types of services that are available through "just one phone call," BITNET's power can be seen from the amount of information interchange that can be started by knowing "just one BITNET address." BITNET services can easily open international lines of communication which might otherwise be unavailable. The aspiration is that future columns can give you even just a peek into the opportunities for

communication available on BITNET. One disclaimer, however. I don't think that pizza is available via BITNET (at least, not yet...).



BENCHMARKS FORUM

BENCHMARKS FORUM is intended to serve as a vehicle for answering questions that may be of general interest to the user community. If you have a question, please send electronic mail to the Benchmarks editor (AS04@UNTVM1) or write it down and drop it by the Computing Center. We will try to answer it in the next issue.

Question: How can I print Greek or Math Symbols on a Laser Printer using WordPerfect on either a Macintosh or a PC?

Answer: Greek and Math Symbols are available on both systems. To print those symbols on an Apple LaserWriter with the Macintosh follow these steps:

1. When inside WordPerfect, click on the "FONT" Menu and select the "SYMBOL" font.
2. The keyboard will now type Greek and Math Symbols. For example <a> is equal to α , is equal to β , etc. (see adjoining chart for equivalents).

LIST of the Month

Each month we will highlight one of the BITNET LISTSERV Special Interest Group (SIG) mailing lists. This month's list...

TEX-L@TAMVM1

Coordinator: Glenn Vanderburg, Texas A&M University
(X075GV@TAMVM1)

TeX is a public domain typesetting system written by Donald Knuth at Stanford. TEX-L was formed to provide a forum for discussion of all aspects of TeX, its companion program, METAFONT, and the WEB system. In addition, macros, extensions, device drivers, fonts, etc. will be discussed and perhaps distributed. ARPAnet subscribers should send requests to TeXhax-request@Score.Stanford.EDU

TeX is used by many people who need to format and print documents with mathematic, scientific, or other special character sets (Benchmarks was produced using TeX from October, 1986 through April, 1987). If you use TeX to format your documents, this list may provide you with handy information to aid you in your use of TeX. If you are thinking about using TeX, the list may be a forum for you to ask questions about its use in order for you to evaluate whether TeX is suitable for your formatting needs.

Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M
Key	α	β	χ	δ	ϵ	ϕ	γ	η	ι	φ	κ	λ	μ
Shift+Key	A	B	X	Δ	E	Φ	Γ	H	I	ϑ	K	Λ	N
Option+Key		$\equiv$		∂	$\leftrightarrow$	$\otimes$	$\heartsuit$		$\perp$	$\emptyset$		$\Re$	$\propto$
Opt+Sh+Key	J		L	TM		{					Apple	}	

Greek and Math Symbols Using the WP Macintosh "SYMBOL" Font

Alphabet	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Key	V	O	π	θ	ρ	σ	τ	υ	ω	ξ	ψ	ζ	
Shift+Key	N	O	Π	Θ	P	Σ	T	Y	ς	Ω	Ξ	Ψ	Z
Option+Key	~	$\downarrow$	$\neq$	ϵ	$\diamond$	$\clubsuit$		$\leftarrow$	$\wp$	$\bullet$	$\oplus$	$\times$	
Opt+Sh+Key	)	$\downarrow$	+	ϵ	Σ				.	$\copyright$			

On the IBM or Compatible PC, this task can be accomplished with the WordPerfect Compose function. Pressing the <V> key while holding down the <Ctrl> key will get you to WordPerfect Compose mode. WordPerfect provides two alternative for creating special characters and symbols. One method is enter-

ring any two key combinations. For example, by pressing the <-> and <L> keys in succession, you will get the £ (British Pound) character.

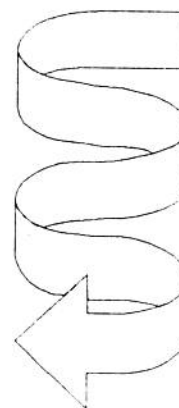
Another method is to use the WordPerfect Special Character Set. WordPerfect 5.0 provides twelve special character sets which can be used when you enter Compose mode.

Character set numbers 6, 7, and 8 provide Math and Greek symbols. All the special character sets, however, are printer-dependent, i.e. the characters that you can use will depend on the printer you are using. The tables below and on pages ten and eleven show the Greek and Math symbols which can be printed on the

This prints all characters in Character Map 6

	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
000	-	±	≥	∞	/	÷					=	≡	ε	∩	Σ	∞				
020	→	←	↑	↔												°			x	
040		Π	∇	∂	*						3	9	p			⇒	⇐	↑	↓	
060	⇔				∪	∩	⊂	⊃	⊆	⊇	⊈	⊉	⊊	⊋	⊌	⊍	⊎	⊏	⊐	⊑
080	⊗	⊕			∧	∨														≠
100		∴														≡				
120		∃	∀																	
140																				
160																				
180																				
200																				€

Character Map Set 6 as Printed on an Apple LaserWriter II



This prints all characters in Character Map 7

	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
000	{	}																		
020					{	}								}	}	}				
040																				
060																				
080																				
100					{	}								}	}					{
120																				
140																				
160																				
180																				
200																				
220																				

Character Map Set 7 as Printed on an Apple LaserWriter II



Apple LaserWriter II and the HP LaserJet II.

These special characters are referred to by entering the set number along with the code combination number,

shown in the tables. For example by entering 8,03 while in the compose mode, you will get the β (Beta) symbol. The © (copyright) is entered as 4,023. See the WordPerfect 5.0 Reference Manual for the complete list

of all the special character sets. WordPerfect also has a file called CHARMAP.TST on the Conversion diskette which you can use to see the characters and symbols you can print with your printer. §

This prints all characters in Character Map 8

	0										1										
	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	
000	A	α	B	β				Γ	γ	Δ	δ	E	ε	Z	ζ	H	η	Θ	θ	I	ι
020	K	κ	Λ	λ	M	μ	N	ν	Ξ	ξ	O	ο	Π	π	P	ρ	Σ	σ			
040	T	τ	Υ	υ				X	χ	Ψ	ψ	Ω									
060			ϑ																		
080																					
100																					
120																					
140																					
160																					
180																					

Character Map Set 8 as Printed on an Apple LaserWriter II



This prints all characters in Character Map 6

	0											1									
	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	
000	—	±	≤	≥	α	/	/	\	+		<	>	~	≈	≡	∈	∩		Σ	∞	
020	-	+	+	↑	↓	+	+	▶	◀	▲	▼	.	.	◦	◦	Å	°	μ	—	×	
040	∫	π	τ	∇	∂	'	"	˜	ε	ℓ	ℓ	3	π	p	=	=	⇒	⇐	↑	↓	
060	⊙	⊙	/	\	\	✓	U	C	D	⊆	⊇	⊃	∅	Γ	Γ	L	J	«	»	∠	
080	⊗	⊗	⊗	⊗	⊗	^	v	∇	T	⊥		⊥	⊥	□	■			[	]	≠	
100	×	∴	∴	∴	∫	ℓ	ℓ	3	ℓ	○	△	◇				α					
120		≡	∇																		
140				○																	
160				⊙							◁	▷	△	▽							
180						×	×		×		×	×							∂	∂	
200	z					ℓ	ℓ	z	ε												

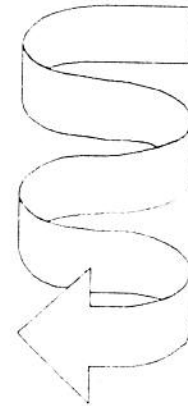
Character Map Set 6 as Printed on an HP-LaserJet II



This prints all characters in Character Map 7

	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
000	⌈	⌋		-	✓	-	Σ	Π	⌋									⌋		
020	⌈					⌈	⌋	⌋							⌋	⌋	⌋		⌋	
040		⌋		⌋				⌋		⌈				⌈		⌋				⌋
060		⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋	/	⌋	-	-						
080		⌋		⌈	⌋	⌋	⌋	-			⌋	⌋	=	⌋	⌋	⌋	⌋	⌋	⌋	⌋
100					⌈	⌋					⌋	⌋						⌈	⌋	
120					⌋	⌋		⌋			⌋				/					
140	⌋																			
160	⌈	⌋		-	⌋	⌋		-												
180				⌈				⌈	⌋	⌋							⌈	⌋	⌋	
200																				
220																				

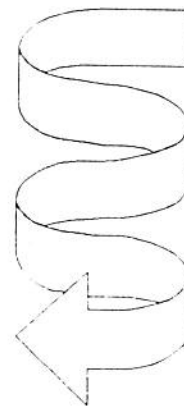
Character Map Set 7 as
Printed on an HP-LaserJet II



This prints all characters in Character Map 8

	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
000	A	α	B	β	B		Γ	γ	Δ	δ	E	ε	Z	ζ	H	η	θ	θ	I	ι
020	K	κ	λ	λ	M	μ	N	ν	Ξ	ξ	O	ο	Π	π	P	ρ	Σ	σ		ς
040	T	τ	Υ	υ	Φ	φ	X	χ	Ψ	ψ	Ω	ω								
060		ε	θ					φ	ω											
080																				
100																				
120																				
140																				
160																				
180																				

Character Map Set 8 as Printed
on an HP-LaserJet II



Benchmarks Reader/User feedback is encouraged. Send all letters, suggestions, etc to (AS04@UNTVM1) or to the *Benchmarks* Editor at:

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MICROCOMPUTERS

The Magic of Desktop Laser Printing

By Claudia Lynch, *Benchmarks* Editor
(AS04@UNTVM1)



The advent of relatively affordable, high-quality, printed output from a microcomputer connected to a desktop printer has produced a cultural revolution, in many ways as dramatic as the invention of the printing press. The ability of individuals to produce their own professional looking newsletters, books, advertisements, documents, form letters, etc., has empowered them to be incredibly creative. This creativity has spawned a cottage industry of personal publishing and created hundreds of jobs in areas that didn't even exist ten years ago.

The HP LaserJet - Setting the Standard

The face of microcomputer-generated output changed forever with the introduction of the Hewlett-Packard LaserJet in 1984. Until that time, "letter quality" was the best you could expect, and that was only available from a daisy wheel-type printer.¹ Of course, the first LaserJet had only one typeface, but that didn't last long. Today, at \$2,595 (down from the \$3,495 of the original LaserJet) the HP LaserJet Series II comes with Courier, Courier Bold, and Line Printer fonts in both portrait and landscape format as well as two cartridge slots. A wide variety of font cartridges are available, from Hewlett-Packard and other vendors, and it is also possible to purchase downloadable fonts.

If that wasn't enough, HP recently announced the LaserJet IID (\$4,295), that automatically prints on both sides of the paper (not possible on any other desktop laser printer) and rotates portrait fonts into landscape fonts.² All these features combine to give you the ability to produce documents that rival those turned out by the major publishing houses, something which would be virtually impossible with a typewriter or an impact printer.

What's So Special About Laser Printers?

Most laser printers have 300-dot-per-inch resolution, which they can use to produce characters of almost any shape and size - an impossible task with typewriters or daisy wheel printers. This ability is what gives the "typeset" look to laser-printed documents.

Proportional Spacing

The mark of high-quality typesetting is proportional spacing. Proportional spacing means that different amounts of space on a line are required for different characters. For example, a lowercase "i" takes up less space than an uppercase "W" and the type is adjusted accordingly. Proportionally spaced type is considered easier to read than the monospaced characters produced by most type-

² HP LaserJet IID Prints on Both Sides of the Page, Rotates Portrait Fonts, PC Magazine, December 13, 1988, p. 36.

¹ Beyond Letter Quality, PC Magazine, November 10, 1987, pp. 393-418.

writers and is readily achievable on a laser printer.

Influential Typefaces

In addition to being exceedingly legible, output from a laser printer is influential. This is because, for whatever reason, typefaces can subtly convey messages beyond the printed word.³ An example is the

Times Roman typeface, which is what is known as "serifed." That is, there are ending strokes on the stems and tails of characters. For some reason, perhaps because it is a relatively old typeface, it connotes tradition and stability. Most newspapers use Times Roman as their major typeface. In fact, it was used to create the words you are reading right now.

Presentation Graphics

Obviously, no document would be complete without suitably impressive graphical illustrations. Laser printers produce these remarkably well, albeit in shades of gray (see "Choosing a Color Printer" on page 14 of this issue for a more

colorful printing technology).

How it is Done

The printing feats described above are accomplished through the process of electrophotography. This process is very similar to the way that office copying machines work.⁴

³ *Beyond Letter Quality*, PCMagazine, November 10, 1987, pp. 393-418.

⁴ *The Ricoh Laser Engine: Challenging Canon's Laser Technology*, PC Magazine, November 11, 1986, pp. 353-355

The Print Engine

Different laser engines, the component that drives the printer, use slightly different methods of electrophotography. There are two basic approaches to transferring an image onto paper, and each approach has advantages and disadvantages. Interestingly enough, the two major producers of laser en-

that bond the toner to the paper.⁵ Proponents of this method say that blacks are darker, particularly in large areas, and print quality and image are sharper. Opponents say that there is unnecessary wear-and-tear on the belt because the entire photoconductor is charged, then erased so that only the portion that is taken up by the image remains.

Write-Black Image Transfer

The "write-black" method of electrophotography is used by the Canon engine. This method of image transfer is virtually identical to that of the "write-white" approach of the Ricoh engine, described above, with two major exceptions. The Canon engine uses a drum in place of Ricoh's belt and toner is attached only to the areas of the drum that have been exposed to laser light. Proponents of this approach claim that there is only a minimal amount of wear-and tear on the drum, since the photoconductor is only charged with the images that are to be produced. This also results in the production of finer lines. Opponents point to the "blacker blacks"

Characteristics of Some Popular Laser Printers

- **LaserJet Series II** - From Hewlett-Packard Co., this non-PostScript laser printer has a Canon engine rated at eight pages per minute. List price: \$2,595.
- **Laserwriter IINT** - From Apple Computer, Inc., this PostScript (licensed by Adobe) printer has a Canon engine rated at eight pages per minute. You may run into problems trying to use this with an IBM-PC. List Price: \$4,599
- **Omnilaser 2108** - From Texas Instruments, this PostScript compatible printer has a Ricoh engine rated at 8 pages per minute. List price: \$5,995.
- **Omnilaser 2115** - Also from Texas Instruments, it has the same characteristics as the 2108 except that it is rated at 15 pages per minute, for letter-sized pages (7.5 for legal size pages) and it can emulate an HP LaserJet Plus. List price: \$7,995.

gines, Canon and Ricoh, each use a different method. Most laser printers, no matter who makes them, use one of these two engines.

Write-White Image Transfer

The "write-white" method of electrophotography is used by the Ricoh engine. With this method, "a light pattern that mirrors the page image shines onto a photosensitive belt. Black toner powder is then applied to the belt and sticks to the places that had not been exposed to the light. The paper is then rolled over the belt, where it picks up the image etched by the toner. The paper then proceeds through heated rollers

advantage of the "write-white" approach mentioned above.

Write-White or Write-Black?

In the end, of course, it is a matter of individual preference as to which approach you prefer. If you are trying to choose a laser printer, it might be best to consider such additional features as ease of maintenance, (maintenance of a printer with a Ricoh engine has the potential for being somewhat messy), cost of ownership, ease of installation, amount of memory, support by the software you intend to use, and networking ability.

⁵ Ibid, page 354.

What About PostScript?

Whether or not your software supports a particular laser printer may be directly related to that printer's ability to support the PostScript page description language. Page description languages (PDLs) are one of the major components of desktop publishing, and PostScript, has become the industry standard PDL.^{6,7}

PDLs

Basically, page description languages allow an application "to tell a printer how to construct a page from a combination of text, fonts, and graphics. They let the computer system specify complete page images as a series of procedures and parameters rather than by indicating every single inked area. A set of routines in the printer or its controller then translates those instructions into the marks that will actually be placed onto the paper."⁸ The end result of all this is that lines and curves are smoother, printer resolution is fully used, and extremely complex fonts can be processed.

The Adobe Interpreter

According to *INFOWORLD*, PostScript has done for printing what asphalt did for roads.⁹ This luxury doesn't come cheap, however. The most favored PostScript interpreter (PostScript is a public domain PDL) is marketed by Adobe Systems, who owns the PostScript trademark. It is licensed to a variety of printer ven-

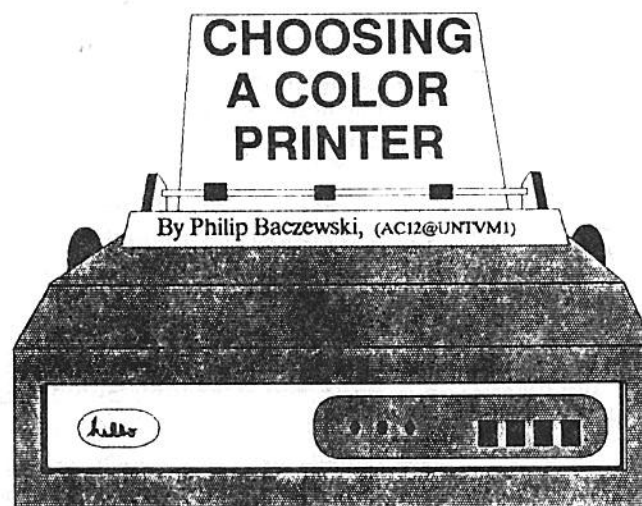
dors and it can add as much as \$1,000 to the cost of the printer.

PostScript Compatibility

It is possible to buy boards that drop into non-PostScript laser printers so that they can provide PostScript support. There are varying opinions, however, as to the wisdom of this approach, as well as to the use of "Post-Script compatible" printers which do not use the Adobe interpreter.

The (Top?) Bottom Line

It is best to thoroughly research the literature on laser printers before purchasing one. The recommendation of the company that produced the software you are planning to use should also be strongly considered. Most companies provide telephone support for their products, and it might be wise to call them and ask for their opinion on any printers you are considering. \$



It's a Colorful World...

There it is - the chart you've been hard at work producing - in four color glory on your computer screen, ready to be printed out in glorious... black and white. Computer display technology has advanced to the point where quality color graphics is accessible to most microcomputer users. For a time, it seemed that the accessibility of comparable printed output lagged far behind. The last several years, however, have seen the introduction of a variety of new color printers of varying cost and output quality, changing the notion from "I wish I could print this in color" to "I wish I knew which color printer to choose." After a closer examination of printers on the market you may find that choosing a color printer may be a bit easier, and that establishing the criteria for your selection may not be as untenable as you first thought.

Color printers available for use with microcomputers can be classified into three categories based upon the technology used in the printing process. These three categories are impact dot-matrix printers, ink-jet printers, and thermal transfer printers. Printer prices range from as little as \$600 for some dot-matrix printers to as much as \$22,000 or more for some thermal transfer printers and commercial ink-jet printers. Obviously, there is a corresponding range of output quality as well. The trick is knowing where in that range your expendi-

⁶ *Putting Text and Graphics in Their Place*, PC Magazine, February 10, 1987, pp. 181-192.

⁷ *PostScript Laser Printers*, INFOWORLD, May 30, 1988, pp. 41-53.

⁸ *Putting Text and Graphics in Their Place*, PC Magazine, February 10, 1987, p. 182.

⁹ *PostScript Laser Printers*, INFOWORLD, May 30, 1988, p. 41.

ture needs to fall to get the output quality you need for your particular application.

The Impact of Color

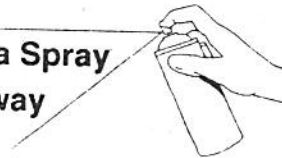
Impact dot-matrix printers generally fall towards the lower end of the price and quality scale. While it's possible to pay as much as \$1800 for a color impact printer, the Apple ImageWriter II and the Epson EX-800 both have a list price of around \$600. These printers, well known for producing black-ink printouts are also capable of color output as well (the Epson requires a \$80 color kit option). To produce color, these printers use a four-color ribbon (yellow, red, blue, black). By overstriking, these printers combine colors to form several other shades. Typical colors available are red, green, blue, yellow, magenta (or sometimes purple), cyan, and black. Some printer driver software can simulate a larger range of shades by combining patterns (dithers) of the seven basic colors.

Dot-matrix printers can have surprisingly good basic color quality, and work well for producing color charts and graphs. This type of printer is generally less costly per page than other technologies. Prices for color ribbons range from \$8 to \$30 and one ribbon can reportedly produce several hundred pages of color output. Impact printers also do not require any special type of paper. Their output can be produced on inexpensive plain paper. The dot density of impact printers can range from 144 to 216 dots per inch, allowing fairly dense areas of color on charts and graphs.

As you would expect, there are some disadvantages to using this technology. Most impact dot-matrix printers cannot print directly onto transparencies. Accurate output from color paint programs can vary depending on the intricacy of the painted image. Subtle combinations of color, and intricate details may be

lost in the dithering process used to expand the color range. Also, since producing various colors may require multiple passes of the print head, the actual printing speed may be quite a bit slower than the printer's published rating which usually refers to printing single-color text. If you plan to use your color impact printer for both text and graphics, you may wish to keep a color and a black ribbon on hand and switch ribbons depending on the type of output you need. If you use your color ribbon to print your text as well as your graphics, the black portion may wear out much sooner than the other colored parts.

Just a Spray Away



The intermediate level of color printing technology is that of the color ink-jet printer. Technically, these are dot-matrix printers also. Ink-jet printers produce output by spraying tiny drops of ink in a matrix pattern. Usually, color ink-jet printers use black, yellow, red, and blue inks which can combine to form seven basic colors like the ones available from color impact printers. Some ink-jet printers, however, use more sophisticated techniques to generate a much greater array of shades. The 180 dpi (dots per inch) Hewlett-Packard PaintJet, for example, can group dots into two-dot by two-dot "super pixels" for an effective resolution of 90 dpi. Different combinations of the four dot colors will appear to the human eye as large pixels of one solid color. Using this method, 330 different shades of color can be generated.

In addition to a wider range of colors, ink-jet printers generally produce areas of color with very little streaking or variation of shade. Several ink-jet printers on the market can print directly onto

transparencies. This is an obvious advantage if you have the need to produce color transparencies on a continuing basis. Most ink-jet printers can print on plain paper, but best results will be gotten by using special clay-coated paper. Some lower quality paper may cause the printer's ink jets to become clogged with paper debris, and other low-grade papers may cause excessive ink bleeding.

Because of the need for special paper, and the cost of replacing ink reservoirs, ink-jet printers may be a bit more expensive to operate than their dot-matrix counterparts. Special paper may cost around seven cents per page. The cost of the printers themselves tend to be higher than dot-matrix devices. Low-end models have a list price of around \$1400 to \$2000. Very high-end commercial models with quite a bit more capability can cost as much as \$75,000 (probably outside the budget of the average microcomputer user). Affordable ink-jet printers, however, will produce excellent charts and graphs and, depending on the software, a higher quality of paint program output than is possible with impact printers.

Full-color

Glossies?

On the high end of the color printer spectrum, are the thermal transfer printers. These printers have a ribbon made of a thin mylar film with a wax-like coating of color pigment. The ribbon has alternating blocks of yellow, magenta, cyan, and black. To produce its output, the printer aligns a colored section of ribbon with the paper and selectively melts small dots of color onto the paper. This process is repeated with all of the other ribbon colors until the complete spectrum of color output is manifested. The result is a glossy

image which can approach the look and feel of a magazine page.

Thermal transfer printers produce the highest quality output of the three technologies discussed here. These printers provide automatic dithering, allowing the colors you pick from your software's palette to be easily and accurately reproduced. Thermal transfer printers also pro-

vide excellent color density. Output resolution can range from 200 dpi to 300 dpi. Like Ink-jet printers, thermal transfer printers can output directly onto transparency material. Some models now offer color PostScript support as well.

Just like the quality, the cost of these printers is greater as well, with prices ranging from \$5000 to \$22,000. Most thermal transfer printers require special paper, not allowing the use of less expensive plain paper. Operating costs, including ribbons and special paper or transparencies, typically run about fifty cents per page. For camera-ready color output without commercial-quality pricing, the thermal transfer printers offer the most capability at an affordable cost.

Making up Your Mind

The first step in making any purchase decision concerning computer hardware is to know the technology involved in that hardware. Hopefully, this article has provided a starting point for understanding the technologies of color printing. The next step in the decision making process is one of continued education and of the evaluation of your particular color printing needs.

The printers mentioned in this article are discussed for comparison

purposes only. To select your color printer, you will need to find out as much as you can about the types and costs of available devices and about those printers' capabilities. A good place to look for information is in commercially-published buyers guides and in computer magazines such as *PC Magazine*, *MACWORLD*, and *AmigaWorld*.¹ Magazine articles

information can be invaluable towards finalizing your choice.

While finding information about the color printers on the market, you must also evaluate your own color printing needs. A good place to start is with the software from which you will be generating color output. If your software does not support the color printer you purchase, then you

may find yourself with a rather expensive piece of high-tech sculpture.

Check the software documentation to see what color printers can be used with that particular program. The other part of needs evaluation is balancing the quality of output you would like with the amount of money you have to spend. Develop a written profile of your "ideal" printer, for example:

- Will you use more than seven colors?
- Do you need to print directly onto transparencies?
- Will you be producing mostly charts and graphs or "painted" images?
- Do you need camera-ready color output?

The first step in making any purchase decision concerning computer hardware is to know the technology involved in that hardware. . . The next step in the decision making process is one of continued education and of the evaluation of your particular color printing needs.

often offer descriptions, reviews, and product comparisons. Such infor-

¹ See the following:

King Color - New Printers Banish Black and White, *PC Magazine*, Volume 7, Number 10, May 31, 1988.

Printing a Rainbow, *MACWORLD*, Volume 6, Number 1, January, 1989

Color Printers, *AmigaWorld*, Volume 2, Number 6, November/December, 1986. (This reference is old but still useful. Since the Amiga makes extensive use of color, color output devices are often featured in Amiga magazines. - pcb)

Once you have your printer profile, product comparisons will be helpful in determining which printers have the technology and features you need the most, and which have the price you can afford. When this whole process is complete, then perhaps, as Walt Disney might say, you can "enjoy the wonderful world of color."§



Talking About Printers: A Roundtable Discussion



Recently, five of the consultants from Academic Computing Services got together to talk about microcomputer printers: Billy Barron, VAX System Manager; Philip Baczewski, Graphics Lab Manager, Academic Timeshare Coordinator, and Associate Editor of *Benchmarks*; Sandy Franklin, Office Automation Specialist; James Shoffit, Lead VAX Operator and System Programmer; and Kevin Mullet, who compiled the text of this article, from the Microcomputer Support Team.

Printer Mythology

Kevin: What are some of the popular myths about printers? ... things a person might start out believing is true about a printer, only to later find that it isn't?

Sandy: "It acts just like an Epson." It emulates this printer or that printer ...and software support. Be sure that a piece of software will support a printer by trying it out. People are going out and buying a new Toshiba model FSXJQRM printer that does all kinds of wonderful things, but their software doesn't support it.

Billy: Some printers will say that they're Epson and IBM-Pro printer compatible, but that fact is that you have to open up your printer and flip some dip switches before you can get those benefits.

Kevin: So I guess that's something someone shopping for a printer would have to watch out for. They may buy a printer that claims to emulate five different printer standards, not noticing the small print in the manual that says you have to dig inside your printer and set the dip switches in order to set the printer to meet the requirements of your software.

Billy: Also... another problem I've had is that I'm always moving printers between PCs, Apple IIs, Macs, whatever... and most printers require that you go inside them and re-configure them to do that kind of work. Normally, when you buy a printer, it's configured, with its default settings, to work with only an IBM... if you're lucky.

Philip: Moving a printer between different computers may require anything from a different cable or a switch box, to completely different printer interfaces. For example, we have an

Epson printer in the Graphics Lab that we use on PCs and on Macs, but to use it on the Macs, we need to have a serial to parallel converter.

Something that people don't often think about is that most printers that run on IBM machines are parallel printers while serial or Appletalk printers tend to be the standard for Macintoshes. There are things available, though, like the Grappler interface that we use in the Graphics Lab, that not only take care of serial to parallel conversion but also have an intelligent interface that makes the Epson look like an Apple Imagewriter to the Mac.

Billy: Another myth is the underline myth. Many printers claim to do underlining, but when you get down to it, they just underline the individual characters, they don't do continuous underlining. Some do and some don't. It depends on the printer you have.

Also, another problem I've had is with WordPerfect. Although I've been able to get continuous underlining with my Panasonic printer before, I've never been able to get it in WordPerfect. For some reason, it just doesn't do it right.

I've noticed that WordPerfect printer drivers tend to do things differently than other programs. *pcb*

Philip: I've noticed that WordPerfect printer drivers do things a little bit differently than other programs.

Kevin: That's a kind way of putting it.

Philip: Often the user has to reconfigure the printer driver in order to take advantage of the features his printer came with.

Sandy: But most users aren't that sophisticated. What they usually end up doing is waiting for the next release of the software and hoping their problem is solved by that.

Kevin: If someone has a certain program, and they want to buy a printer to use with that program, how would they go about doing that?

Sandy: Have it demonstrated first. Don't believe the ads or the salesmen. Have the printer demonstrated with the kind of equipment

you're going to be using it with.

Billy: The **PRINTER.TST** document that comes with WordPerfect is actually pretty good, because it covers all the major printer features: bold, underlining, boxes...

Kevin: I think most word processors come with some kind of a document that you can use to test a printer.

James: Another thing people should consider is that although Epson is a big name in printers, the true Epsoms may not have the full IBM compatible character sets, so if you do a screen dump or print documents with graphics characters you may want to check that capability out with a printer before you buy it.

Favorite Printers

Kevin: I'd like to know what everyone's favorite printer is.

Billy: I prefer the Panasonic 1091 or 1092. They've got good Epson and IBM ProPrinter emulation. The ribbon cartridges are long lasting

and they don't get off track like other printers' do.

[The Panasonic Model 1091 has been replaced with a new model, the 1191, that offers higher speed, more fonts, and better paper handling capabilities. The Model 1092 is also expected to be discontinued in favor of the Model 1124, a 24-pin printer. - ed.]

Philip: ...and the Panasonic cartridges have a reinking feature too. I'm jumping in here because it's one of my favorites too.

Billy: ...and the friction and tractor feeds work excellently on that printer.

On a Panasonic, you'll have to really look close to see that a NLQ printout was from a dot-matrix printer, on the Epson I can hold it off five feet and tell it was done on a dot matrix.

James: My favorite printer is the NEC P2200. It's a 24-pin printer, the letter quality mode looks

great, the ribbons are small and easy to install, you can load the paper in a variety of ways and you need never lose a sheet of paper, and it will even allow you to use single sheet paper without requiring you to unload the continuous form. It's got no DIP switches and I've never had a single problem with it.

Philip: My most favorite, of the ones I've worked with, is the Panasonic 1092 - for the reasons that Billy mentioned.

Sandy: I was real impressed with the Epson LQ-850. The Epson was not my favorite machine until we started using Word Perfect. WordStar had a very difficult time using all the special capabilities of different printers. With Word Perfect it's a lot easier, version 5.0 is even better.

Kevin: Least favorite printer?

Sandy: Diablos. They are not dependable machines. They use printwheels, and printwheel printers vibrate strongly, and things that vibrate fall apart. If you keep it on the same table as your PC, you damage your PC. I've heard horrible war stories about them from all over campus.

Terrible Tabulating Tales

Kevin: What are some of the more memorable horror stories you have to tell?

Billy: All my problems with an IBM Wheelwriter... trying to keep paper and labels in it. It got to the point where I had to guide everything through the printer by hand. That printer was pretty hopeless.

Kevin: James?

James: Well, that Gemini 10x I had didn't give me any problems for a long time until one day... it would print out a page or two and as soon as I turned my head, the ribbon eject button would go <*PLINK*> and there went my ribbon, flying out of the machine.

Kevin: I'll bet Sandy has collected a lot of horror stories about microcomputer laser printers.

Sandy: The stories I have about laser printers aren't that bad, it's just that when the printers first came out, software support for them was so bad. Now it's much better though. The main problem now is that people don't realize that they're supposed to maintain and clean their laser printers.

Philip: I think it's worth mentioning again that a lot of what you get out of your printer depends on your software. I got pretty frustrated at WordPerfect on day while trying to use the letter quality fonts on my printer. I had to search through lots of font definitions, and finally, on about the sixth one, I found what I wanted. Many people don't realize that the quality of your software often determines how effective your printer is.

Kevin: I agree. I think that everyone should bear in mind that their computing is only as good as their weakest link. If they've got an outstanding printer but only mediocre software to use with it, they limit the quality of their computing results. By the same token, if they've got the latest whiz-bang combination desktop publishing word processor with built in spreadsheet, database and telecommunications links, but have a 1980 vintage TRS-80 printer, they might as well forget learning about all the nifty features of their program, because they're not likely to be able to use them.

Probably the best advice a person shopping for a printer could receive would be to buy it the same way as they should buy a computer. Decide what results they want out of their machine, find software to give them the results they want, and find hardware to run that software. §

On The Lighter Side

HELP DESK: HELP DESK, Are you calling about a problem?

CUSTOMER: Yes, I need help ... Where's the "Any Key?"

HELP DESK: What do you mean "Any Key?"

CUSTOMER: Well it says here to press the "Any Key" to continue and I cannot find the "Any Key."

HELP DESK: Oh

From The Help Desk Institute, Dallas, Texas.

The NeXT PC?

By Billy Barron, VAX System Manager (BITNET:BILLY@UNTVAX)

*Two articles on the NeXT appeared in the November 1988 issue of **Benchmarks**. I am not going to repeat the information in those articles so I would suggest reading them first for an overview of the NeXT and then read this article for more details. Specifications for the NeXT are from the November 1988 issue of **BYTE**.*

On March 2nd, I went to a NeXT Computer demonstration here on campus in the GAB. I went to the demonstration thinking the NeXT was just another Unix workstation with a windowing environment. I left convinced that the NeXT is the best low cost workstation on the market.

Graphics

The NeXT has a 17 inch monochrome monitor that has a pixel display of 1120 by 832. This comes to 94 dots per inch. In comparison, the Mac has only 72 dots per inch. The monitor can only display four shades of grey. Fortunately, NeXT promises a color system sometime in the future (maybe 1990?).

The NeXT uses Display PostScript for its screen. Display PostScript is an extension to Adobe PostScript especially designed for screen displays. It makes a lot of sense for the NeXT to use the same page description language as laser printers, on which PostScript is becoming the standard, and video displays.

Sound

Out of all the NeXT's features, the one that impresses me the most is the sound capability. The NeXT is equipped with a Motorola DSP56001 (Digital Signal Processor) for handling digital sound. The DSP56001 gives the NeXT 144 decibels of dynamic range. The monitor has a built-in speaker, a headphone jack, two channel analog jacks for connecting stereos, and a microphone jack for voice input applications, such as voice mail. All of these features lead to the best sounding computer on today's market. In fact, one of the NeXT representatives said that the sound quality is only slightly less than a CD player.

Programming the NeXT

One of the major goals of the NeXT is to reduce the amount of coding required to write a user interface. About 90% of the code in a typical program on a microcomputer is just the user interface. The NeXT tries to reduce that 90% to just 10% through Interface Builder. Interface Builder is a program that allows the creation of the user interface without writing a single line of code. The programmer just points and clicks a few times and the Interface Builder writes the Objective-C program for the user interface. For example, a NeXT representative created a John F. Kennedy biographical application in 5 minutes which would have taken hours to write on a PC or even a Mac (provided they had the sound capabilities of the NeXT).

The main programming language of the NeXT will be Objective-C. Objective-C is an object-oriented programming language that is sourcecompatible with ANSI C. Object-oriented programming is currently a very hot topic in the computer field. In object oriented programming, the programmer focuses on the objects instead of the actions. This, supposedly, allows better programs to be written more quickly.

Software

The system comes with Objective-C, EMACS, Window-based text editor, Interface Builder, Digital Libraries, SYBASE database server, Allegro "Common" Lisp, Mathematica, electronic mail, file manager, and a few other packages. According to NeXT, about 500 developers have bought NeXT computers, so lots of third party software should be on the way. Based on rumors, we will probably see FORTRAN, Adobe Illustrator, a spreadsheet from Lotus, and X-Windows in the near future. I expect that in 2 years the number of application software packages for the NeXT will number in the hundreds or thousands.

Hardware

The standard configuration of the NeXT comes with one read/write erasable optical disk drive. A Winchester hard disk and a second optical disk drive are optional. In the standard configuration, there is a big gotcha. The optical disk is not really removable because it contains the operating system. If the disk with the operating system is removed from the machine, the NeXT will crash. For anyone who will want to use removable storage, they will have to purchase either a Winchester or a second optical disk drive.

Another note about the disk drives on the standard configuration is that the operating system takes up all but 100 MB of the optical disk.

The NeXT laser printer prints 400 dots per inch and 8 pages per minute. To help maintain the 8 page per minute speed, the NeXT itself, instead of the printer, processes the PostScript and then sends a bit map to the printer. The NeXT is capable of printing to other PostScript printers, such as the Apple Laserwriter.

Portable NeXT is another interesting option. The Portable NeXT is an extra keyboard and monitor. The

idea is that you keep these pieces at home (or anywhere else) and you only have to transport your CPU box instead of the whole system.

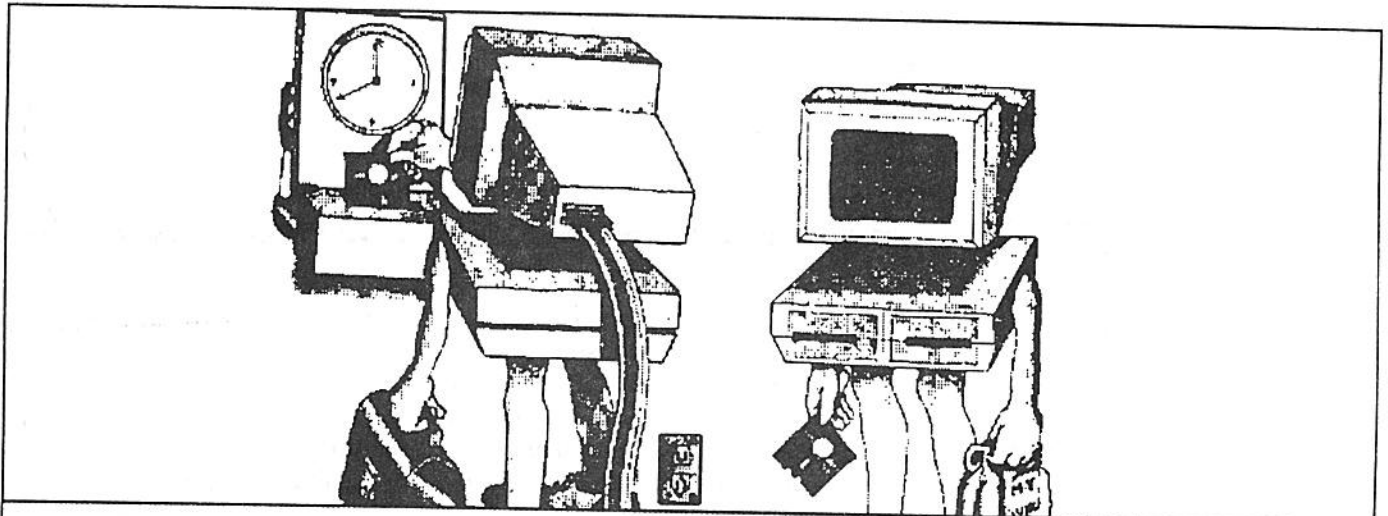
NeXT standard configuration \$6500:

- 330 MB Winchester - \$1995
- 660 MB Winchester - \$3995

- Laser Printer - \$1995
- Portable NeXT - \$1000
- 2nd Optical Disk Drive - \$1495 *
- 4 MB Additional Memory - unknown price
- Microphone (Sony) - \$50

- Clip-On Microphone (Radio Shack) - \$16
- Optical Disks - \$50

*Price according to *Byte Magazine*. NeXT, Inc. has not officially set a price. \$



Micro-Tips

*This column is intended to serve as a forum for sharing useful tips on making more productive use of microcomputers. If you have a tip that you feel may be of use to campus users, submit it to the **Benchmarks** editor for possible inclusion in a future issue.*

Taking Care of Your HP LaserJet Printer

By Sandy Franklin, Office Automation Specialist

After conversations with Jim Rosenbaum, Owner/Operator of Cartridge Care, we decided a guide to taking care of the laser printers was needed. Cartridge Care is the company we contract with on campus to reuse the toner cartridges for the HP LaserJets and Apple Laser-Writers. He has seen a lot of machines on campus that are having problems because they are not being maintained. This article will hope-

fully give some information about the laser printers, as well as suggestions as to proper maintenance.

The laser printer consists of several components, including the toner cartridge, the transfer guide slip and lock tray, the transfer corona wire, the paper feed guide and the fuser assembly. As the equipment is operated, these parts can become dirty.

The area of the paper feed guide, the transfer guide and lock tray, and the transfer corona wire can become dirty from paper dust and the toner collecting on the wires. The fuser assembly can become dirty from the toner. The paper feed guide can collect paper dust.

Problems That Can Occur

1. Leaving the HP LaserJet Series II on when not in use can also cause problems. The engine recycles every 20 minutes. If the printer has not been used, this could cause the toner to cake on the roller bar causing streaks or blobs after dry runs of the engine. Cleaning the corona wire will eliminate 95% of streaks. If it doesn't, chances are the drum is scratched and would need to be replaced.

There are reasons to leave the equipment on, however. If the printer is the LAN (Local Area Network) printer, it will need to

be left on. The equipment will need to be cleaned more often to keep it working cleanly.

2. If there is a graying or cloudy effect, it could be an indication that the drum is bad and needs to be replaced.

3. On the HP Series II, if the printer indicates the toner is low, go ahead and switch the cartridge. It is not a good policy to run out of toner on this machine.

4. The HP LaserJet and LaserJet Plus cartridges have counters for the number of sheets processed. Whether or not the cartridge is really empty will depend on the type of jobs being run. It takes more toner for a long job than for several short jobs. So, just showing "red" on the toner indicator on the older model machines does not necessarily mean the cartridge is empty. Also showing "green" would not mean it was full if the jobs being run were extremely long.

Kevin Mullet and I are in the process of putting together a "guide to care and feeding of the laser printers," including the Apple LaserWriter and the Hewlett-Packard LaserJets. Please watch *Benchmarks* for an announcement of when that document will be available.

Mr. Rosenbaum is extremely interested in helping us get our equipment maintained properly. He has several cleaning supplies that have been a great help to us. There are cleaning sheets that are run through the machine to pick up loose toner. There are also cleaning tools resembling overgrown Q-Tips that will reach in where the toner accumulates. We are doing this cleaning every morning at the Computing Center. There is a lot of throughput on our equipment and it requires this type of daily maintenance. We also follow the Installation Manual that comes with each cartridge. These techniques will be incorporated into our manual. §

A Lexicon of Desktop Printing

By Kevin Mullet, Academic Computing Microcomputer Support (ACS2@UNTVAX)

It was a dark and stormy night and I was sitting at my desk. It was just the two of us, my printer and me, when it began to type - tap, tap, tap . . .

Appletalk - Originally, the name Apple Computer Inc. used to describe the networking protocol and cabling system used primarily to connect Macintoshes and printers. The protocol is still called Appletalk, but the actual cable used to connect the computers and printers is called **Localtalk**. To attach a Macintosh to a printer, you would usually use **Localtalk** cable. The "language" these two devices then use over that cable is **Appletalk**.

Cartridges - Small removable plastic boxes, not unlike game cartridges made for home computers, in which fonts are permanently stored for use by the printer.

Centronics Parallel - A parallel printer interface is one in which the information from the printer is communicated in groups, usually of eight or sixteen bits. "Centronics" refers to a specific configuration for doing parallel printing, and has been the primary configuration used in used on microcomputers for several years.

CPS - Characters Per Second. This is roughly equivalent in value to miles-per-gallon on a car. The figure posted for any particular printer should be used for comparison only. Actual printing speed may vary greatly depending on the particular printer features used.

Cut sheet feed - Cut sheet feeders, when attached to a printer, allow you to use standard plain paper, without having to manually feed in each sheet. These feeders are typically controlled by the software run on the computer attached to the printer.

Daisy wheel - The original letter-quality printer. These printers accomplished their printing by striking tiny facsimiles of the characters with a tiny hammer against the ribbon and paper. Although less than ten models of daisy wheel printers are still in production, they continue to value for anyone who can't afford another printer capable of high-quality output. These printers are typified

by their high-quality text output, loud noise, vibration, and inability to do graphics.

Descenders - The part of a character that dips below the baseline, such as in "j", "g" or "p". Many very low end printers do not support descenders in their character set.

Dip Switches - Dual Inline Pin switches. A switch or set of switches that may be used to change the essential configuration of a printer. These switches are usually accessed on a printer by removing the cover to reveal the main circuit board of the printer.

Dot matrix - The variety of printers in which the printing is done by a small group of pins that passes over the page, marking dots as it passes. The majority of microcomputer printers in use are of this variety. The print quality of these printers varies greatly. These printers are generally known by their speed, graphics capability, moderate noise and diversity of features.

Dots per inch - The measurement of graphics resolution often used with personal microcomputer printers. Actually, the industry method of measuring resolution is lines per inch, which is more precise optical measurement of what can be seen on the output, as opposed

to how many dots the machine can put into a square inch. Dots-per-inch is a dual purpose catch phrase that is also used as a marketing hook.

Draft - Much to the dismay of Anheiser Busch, "draft", for printers, means the highest speed and lowest quality available on a printer. It's generally true that speed and quality on a given printer are inversely proportional. On any given printer, as you utilize more of its features to increase the quality of the output, you lose speed.

Emulation - Although there are many, many brands of printers available in the microcomputer market, only a handful of name brands can be said to work with a wide variety of software. The solution that many manufacturers find to the problem of selling a printer in a market of giants is to make their printer imitate, or emulate, one of the ruling giants. Generally, the best bet is to find a printer with good Epson or IBM or Postscript emulation.

Escape code - The sequence of special codes sent from a computer to a printer to instruct it to do something. Escape codes can command a printer to do everything from starting boldface, underlining and superscript to changing the form length or even printing a map of Europe. Typically, a printer is said to "support" a printer if it

knows all these codes and shields the user from knowing that they exist while still making many of the printer's special features available.

Font - A font is a singular combination of a typeface (Times Roman, Helvetica, Avant Garde, etc.), type size (12 point, 34 point...), and type weight (normal, bold...). Many people use **font** as a misnomer for typeface.

Friction feed - The type of paper feed mechanism wherein the paper is advanced by the friction between two rotating rollers. This method is usually used for handling non-tabulating paper in dot-matrix and daisy wheel printers. While this paper feed method is quite acceptable for single sheets of paper, it is notorious for misfeeding with continuous form paper.

Graphics - The most used marketing cliché for printers. Although printer ads typically show their product with impressive graphics streaming out of the top of the printer, most printers spend 90% of their service life as text printing devices. If you're an average PC or printer user, the graphics capability on your printer is not nearly as important to you as its text quality.

Ink jet printer - Although this type of printer qualifies as a dot-matrix printer, the output is produced by a

series of tiny jets, shooting well proportioned droplets of ink onto the paper to produce the output. This type of printer is generally known for its quiet operation, high-quality output, and moderately high cost.

Interface - The means of communication between the computer and the printer. Usually, this is limited to serial, parallel or AppleTalk.

Landscape - Many software/printer combinations can print both right-side-up and sideways. Printouts are in landscape mode when they're wider than they are tall.

Laser - Light Amplification by Stimulated Emission of Radiation, or in printing context, the kind of printer everybody wants but can rarely afford. Laser printers are characterized by their high quality output (300 dots per inch or better), speed (several pages a minute), silence of operation, and cost (beginning at just under \$2,000). Although a few other existing printing technologies can render the same graphics (technically, on a laser printer, everything is graphics, even text) quality as a laser, the laser printer is the undisputed king of the hill in functionality with a host of graphics and desktop publishing software.

Letter Quality - Text described as letter quality is that which

successfully hides the technology with which it was printed. Letter quality text from a dot matrix printer, for instance, would appear to be smoothly and professionally rendered characters instead of a matrix of separate dots.

Line printer - A printer that prints a line at a time. Usually used for high speed output from mainframe and mini computers, although some line printers are finding their way into the microcomputer market.

Lines per inch - The method of measuring resolution in optics and typesetting. The popular method of measuring by dots-per-inch is a corruption of lines-per-inch.

Narrow carriage - Usually refers to printers that feed paper 9 inches wide or smaller

Near-letter quality - A feature of printers that can't quite print letter quality.

Need - Often confused with wants when buying a printer.

Nine pin - Most dot matrix printers have a matrix of nine pins that do the printing. Since number of pins is often directly proportional to the quality of output, nine pin printers usually have lower quality output than the new twenty-four pin printers.

Page description language - Because of the complexity of the output that is required from laser printers, many use a *page description language* (PDL) such as **PostScript**. These languages are similar to programming languages, except that their application is limited to graphics-related tasks. Although page description languages were born on the laser printer, they're spreading to high-end graphics displays such as that on the NeXT.

Page printer - Printers in this category print a page at a time. Laser printers are page printers.

Plotter - These are special purpose output devices that use mechanical arms that can hold one or more pens to trace out raster graphics.

Portrait - In portrait mode, individual pages of a printout are taller than they are wide. See also *landscape*.

Postscript - A popular page description language. Originally conceived to support the Apple Laser Printer, Postscript is now used in a wide variety of applications on both Apple and non-Apple computers and printers.

Printer - One of the most critical yet most often overlooked links of a user's computing chain.

Raster graphics - In raster graphics, the image is

described in terms of a matrix of dots that are either turned on or off. Graphics described in this manner are often printed out faster at the expense of functionality. in the generating software.

RS232 - Currently the most popular standard of microcomputer serial communications.

Serial - A form of computer communications in which the bits of information line up single file to move from place to place.

Soft-font - Fonts that may be used with a given printer only after they are copied from off-line storage like a hard disk to the printer. Correspondingly, the fonts that are built in to a

printer and don't need to be downloaded before they're used are called *hard-fonts*.

Software support - When a given printer is said to support specific software, it generally means that the computer program(s) you want to use with it will directly use your particular make and model of printer, and will take advantage of many of the fancy features you paid for.

Tractor feed - The method of feeding paper into a printer where a set of two pin-feed tractor mechanisms on either side of the paper pulls it through the printer while

holding specially cut perforations in the paper.

Twenty-four pin - See *nine pin*.

Typeface - A particular style of print, such as Times Roman, Helvetica, Avante Garde, etc... See also *font*.

Vector graphics - A method of describing graphics using objects, like a circle drawn from one place to another. Generally, vector graphics take longer to process and print than raster graphics (see definition).

Want - Generally confused with *needs* in printer buying.

Wide carriage - Any printer carriage able to accept paper wider than nine inches. §

VAX COMPUTER CLUSTER

Printing From the VAX to a PC Printer

By Billy Barron, VAX System Manager (BILLY@UNTVAX)

Have you ever wanted to print something from your VAX account at your local PC and/or printer? This article will show you how to do that when using either Procomm or MS-Kermit to communicate with the VAX. Similiar techniques can be applied when using other mainframe and minicomputer systems or other communication packages.

Screen Dumps

If the output to be printed is on your screen, it is very simple to print it out on the PC. In MS-Kermit and Procomm, just hold the <Shift> key down while

also depressing the <Print Screen> key. Note: The <Print Screen> key may be labeled as *PRINTSC* or *PrintScrn* on your keyboard.

Longer Printouts

If the output to be printed will not fit on one screen, a key sequence which toggles the printer on and off must be used. In Procomm, this key sequence is <ALT><L>, and in MS-Kermit, the key sequence is <CTRL><Print Screen>. The procedure is to hit the

printer toggle key sequence to turn on printing, type the commands to get your desired printout, and then hit the printer toggle key sequence to turn off printing.

For example, let's say you need to print the file TEST.PAS and are using Procomm as your terminal package. First, hold the <ALT> key down while depressing the <L> key. Then type TYPE TEST.PAS (your printer should start printing after you hit the <Return> key (may be <Enter> on your keyboard). After the file has finished printing, press the <ALT><L> keys again. If you wanted to get the output of a program, you could just replace the TYPE command with the RUN command to execute your program.\$

Tips and Tricks for VAX Printing

By Billy Barron, VAX System Manager
(BITNET:BILLY@UNTVAX)

There are several tips and tricks that will make your life much easier and your output better formatted when it comes to printing files from the VAX to the ISB and BA HP-2680A laser printers.

Fonts

Picking the correct font is half the battle for getting a good printout. For programming lists and program output, the TNS1 font provides a good non-rotated printout. For any printout that needs to be rotated like most documentations, EL01 is the usually the best font. EL01 is 90 characters wide instead of 77 or less characters wide like TN01 and PI01. The 90 characters is wide enough so that 80 column files print without line wrap or truncation. For big printouts, it is best to use the LP21 or LP41. LP21 prints two pages on a single physical page and LP41 prints four pages on a single physical. Since less paper is used, the university saves some money on paper, toner, and maintenance. Additionally, using

March Top Ten VAX Programs: Frequency of Runs

Program	Description	Number of Runs	Percent of Total
1. LOGINOUT	User login	88146	16.6
2. SET	VMS Utility	79018	14.9
3. DELETE	VMS Utility	50923	9.6
4. DIRECTORY	VMS Utility	37662	7.1
5. TYPE	VMS Utility	29777	5.6
6. EDT	Editor	27996	5.3
7. NETSERVER	DECnet Server	23415	4.4
8. SHOW	VMS Utility	20677	3.9
9. User Programs	Compiled Programs	19703	3.7
10. SYSLOGIN	User Login	16483	3.1
Total		530241	

March Top Ten VAX Programs: CPU Time Used

Program	Description	CPU Time	Percent of Total
1. User Programs	Compiled Programs	24 18:59:26.28	61.3
2. GAUSSIAN	Gaussian 88	3 03:15:01.86	7.8
3. EDT	Editor	1 09:56:22.84	3.5
4. MAXCLAS	ERDAS Program	1 01:12:19.67	2.6
5. PASCAL	PASCAL compiler	1 00:06:43.18	2.5
6. BACKUP	VMS Utility	0 16:37:25.29	1.7
7. LOGINOUT	User login	0 14:11:47.64	1.5
8. DELETE	VMS Utility	0 13:22:48.10	1.4
9. MAIL	VMS Mail	0 11:33:35.26	1.2
10. ACC	VMS Accounting Utility	0 09:05:14.40	0.9
Total		40 10:47:07.70	

LP21 or LP41 helps keep laser turnaround time down.

Margins

Many users need printouts suitable for binding. The VAX PRT utility has a /INDENT=*n* qualifier where *n* is the number of spaces the documentation should be shifted to the right. For example, for a 10 character left margin, the command to type would be PRT/INDENT=10.

Line Wrap

By default, PRT wraps any line that will not fit onto the next line. Some printing applications need this feature turned off. The command to run

PRT in non-line wrap mode is PRT/NOWRAP. To turn off line wrap and have an indentation, the command is PRT/INDENT=10/NOWRAP.

Page Breaks

Page Breaks can be done by adding form feeds into the file to be print. In the EDT editor, form feeds can be added by pressing <CTRL><L>. In the TPU editor, form feeds can be inserted by pressing <CTRL><V> < CTRL><L>. [For more information about the HP-2680A Laser Printers and their various print environments, read the two articles at the beginning of this issue - "New Printing Environments Available on the HP-2680A Laser Printers," and "Taking Advantage of HP-2680A Laser Printer Font Options." - ed.]\$

COMPUTER SERVICES

Mainframe Performance Statistics

NAS/8083 Dual Processor Performance Statistics for February

CPU	SYSTEM	Scheduled Operating Hours	Planned Maintenance Hours	Planned Production Hours	Unplanned Maintenance Hours	Production Hours Achieved	System Uptime
ACAD	VM/SP3	744	0.00	744.00	7.90	736.10	98.9%
ACAD	MUSIC/SP	744	37.87	706.13	8.12	698.01	98.9%
ACAD	MVS/JES2	744	0.00	744.00	9.33	734.67	98.7%
ACAD	COMPLETA	744	0.00	744.00	13.20	730.80	98.2%
ADMN	MVS/JES2	744	0.00	744.00	4.18	739.82	99.4%
ADMN	COMPLETA	362	0.00	362.00	5.64	356.36	98.4%
ADMN	ADABASA	744	25.80	718.20	4.81	713.39	99.3%

System Uptime = (Production Hours Achieved) / (Planned Production Hours)

Production Hours Achieved = (Planned Production) - (Unplanned Maintenance)

Scheduled Operating Hours = (Planned Maintenance) + (Planned Production)

MUSIC/SP Planned Maintenance Hours include 21.10 hours for system backup and 16.77 hours for VM/SP3 system backup.

ADABASA'S Planned Maintenance Hours include 25.80 hours for system backup.

The ACAD CPU achieved 100% uptime; the NAS/7360 DASD achieved 100% uptime; the NAS/7380 DASD achieved 100% uptime. The ADMN CPU achieved 100% uptime; the NAS/7360 DASD achieved 100% uptime; the

NAS/7380 DASD achieved 100% uptime.

Lost productivity is calculated as the greatest amount of elapsed time that any

one of the production systems was unavailable for scheduled operation. Lost productivity hours were contributed to by the key causes appearing in the table below.

ACAD CPU:

Miscellaneous

- | | |
|---|--------------------|
| 1. Autostart failed after VM SPOOL filled with BITNET reader files. | 5.62 HOURS |
| 2. Emergency shutdown due to failure of chilled water units. | 3.75 |
| 3. COMPLETA system maintenance. | 3.37 |
| 4. System development. | 0.52 |
| TOTAL | 13.26 HOURS |

ADMN CPU:

Miscellaneous

- | | |
|--|-------------------|
| 1. Emergency shutdown due to failure of chilled water units. | 3.22 HOURS |
| 2. COMPLETA not started according to schedule. | 2.00 |
| 3. Systems development. | 1.86 |
| 4. COMPLETA system failure. | 0.42 |
| TOTAL: | 7.50 HOURS |

DISK BACKUP SCHEDULES

OS/MVS Backup Schedule

OS/MVS disk packs (academic and administrative) are backed up daily, Tuesday through Saturday, from 4-6:30 a.m., and Sunday from Midnight to 3 a.m.

VM/CMS

Backups of VM system disks and CMS mini-disks are performed every Wednesday morning at 3 a.m. CMS mini-disks are also backed up every other day sometime during the early hours of the morning. Users do not have to log-off during these backups.

MUSIC/SP Backup Hours

A message will be sent to all users signed on to MUSIC/SP approximately 10 minutes before backups are begun. It will be in the form
****MUSIC SHUT DOWN AT xxxx AM-SCHEDULED BACKUP****. To find out

the backup hours while signed on to MUSIC/SP, enter **HELP HOURS**. The following backup schedule is currently in effect:

Tuesday 3 a.m. (for about 3 hours)
 Weekly backup
 Wednesday 3 a.m. (for about 2 hours)
 Daily backup
 Thursday-Monday 4 a.m. (for about 1 hour)
 Daily backup

PHOENIX Backup Hours

PHOENIX is backed up weekly on Sunday night. The backup begins at midnight and lasts for approximately 30 minutes.

VAX Backup Schedule

Incremental backups of the VAXcluster are performed Monday through Thursday at 6 p.m. Users do not have to log-off, but any files that

are open at the time of the backup will **NOT** be backed up.

Full backups of both systems are done every Friday beginning at 8 a.m. These generally will take all day to complete. Again, users do not have to log-off, but any files that are open will not be backed up.

A "Stand Alone" backup of the system disk is done once a month. This procedure makes a copy of the system disk that can be used to restore its contents if the disk is completely destroyed. The system will be shut-down for this. Watch the system log-on message for specific times and dates.

NOTE: Requests for restoration of files should be made via MAIL to the username OPERATOR. Your file can only be restored if it existed before the last backup was done. §

ACADemic (NAS) Program Hit Parade

March Top Ten Programs : Frequency Of Runs

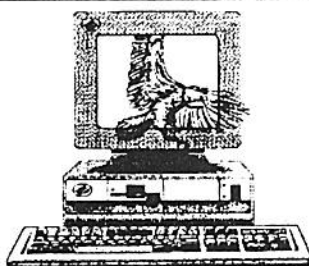
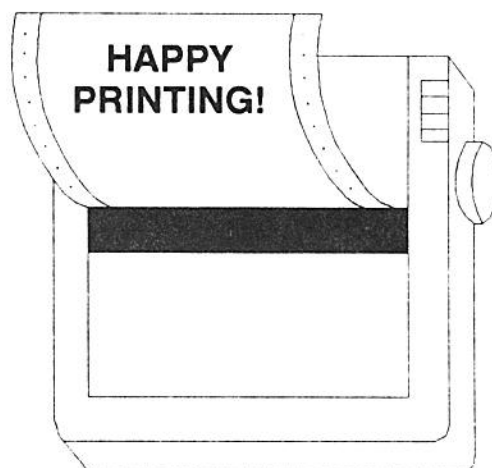
Program	Description	Number of Runs	Percent of Total
1. IEWL	Linkage Editor	16742	19.6
2. PGM=*.DD	Compiled Program	16009	18.7
3. IKFCBL00	VS COBOL Compiler	12727	14.9
4. IEBGENER	IBM Utility	7235	8.5
5. IEV90	Assembler H	5469	6.4
6. PTPCH	Dataset Lister	4139	4.8
7. SASLPA	SAS	3522	4.1
8. IEFBR14	IBM Null Utility	3310	3.9
9. CASMA001	Sort Utility	2748	3.2
10. SPSSX	SPSS ^x	2437	2.8

MarchTop Ten Programs: CPU Seconds Used

Program	Description	CPU Seconds	Percent of Total
1. SASLPA	SAS	29946	22.8
2. PGM=*.DD	Compiled Program	29229	22.3
3. SPSSX	SPSS ^X	26248	20.0
4. IKFCBL00	VS COBOL Compiler	12853	9.8
5. ADARUN	ADABAS Utility Module	3988	3.0
6. IEV90	Assembler H	3973	3.0
7. PTPCH	Dataset Lister	3926	3.0
8. SCRIPT	Waterloo/SCRIPT	3385	2.6
9. FATS	Tape Verification Program	3209	2.4
10. IEWL	Linkage Editor	2738	2.1

The programs listed in this section were used the most frequently on the NAS CPU during the month of March, 1989.

Please Note that ACAD is the official designation of the part of the NAS/8083 CPU that is dedicated to faculty and student use. The portion of the computer reserved for University administrative purposes is termed ADMN.\$



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